

**REMARKS**

Claims 5, 9, 27, 31, 36 and 39-44 are pending. Claims 36, 39 and 40 have been amended.

Claims 41-44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Ciardella I (US 5,711,989). This rejection is respectfully traversed.

Claim 41 recites an apparatus for manufacturing a semiconductor device comprising, *inter alia*, “a substrate holding unit for holding a semiconductor wafer substrate, wherein said semiconductor wafer substrate is provided with at least one electrode formed on a first surface thereof; a discharging mechanism for discharging droplets of raw sealant resin ... onto said first surface of said semiconductor wafer substrate ...; a drive mechanism for displacing at least one of said semiconductor wafer substrate ...; [and] a control unit for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode, ...wherein said control unit is constructed to calculate a position based on said image information for said drive mechanism to displace said at least one of said semiconductor wafer substrate and said discharging nozzle, and for said discharging mechanism to discharge said droplets of raw sealant resin on said first surface of said semiconductor wafer substrate excluding said at least a portion of said electrode” (emphasis added). Applicant respectfully submits that Ciardella I does not disclose these limitations.

The control unit must be structurally formed to control the discharging mechanism in the claimed manner. MPEP § 2114 indicates that “the prior art cannot anticipate the claim if there is any structural difference.” Applicant submits that the control unit of Ciardella I identified by the Office Action is not structurally formed to control the discharging mechanism. The Office Action only asserts that the control unit of Ciardella I “is capable of” controlling in this manner. Applicant respectfully suggests that capability does not equate with a structural limitation. Additionally, this limitation does not relate to the material or apparatus to be worked on, and thus MPEP § 2115 does not apply.

The Office Action states at paragraph 7 that no structural difference appears in applicant's claims to support this limitation. Applicant submits that the language of the claim (said control unit is constructed to calculate...) supports the limitation. Additionally, the specification repeatedly supports this limitation. See, for example [0127] ("following the calculation by the control unit 33"), [0071] ("the control unit 33 is adapted for calculating").

Applicant respectfully submits that Ciardella I does not disclose, teach, or suggest "a control unit for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode...wherein said control unit is constructed to calculate a position based on image information for said drive mechanism to displace said at least one of said semiconductor wafer substrate and said discharging nozzle..." as recited in claim 41.

Since Ciardella I does not disclose all of the limitations of claim 41, claim 41 is not anticipated by Ciardella I. Claims 42-44 depend from claim 41 and are patentable for at least the same reasons. Applicant respectfully requests that the 35 U.S.C. § 102(b) rejection of claims 41-44 be withdrawn and the claims allowed.

Claims 36, 40, and 41-44 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Bouras (U.S. 5,906,682) with reference to Ciardella II (US 5,505,777) (incorporated by reference into Bouras). This rejection is respectfully traversed.

Claims 36 and 40 recite structural limitations similar to claim 41; therefore, Bouras even with reference to Ciardella II, does not cure the above-identified deficiencies of Ciardella I.

Specifically, Bouras discloses that an epoxy 18 and solder pads 14 completely cover the solder balls 12. FIGs. 2-3; Col. 1, ln. 48-50 and 58-67. Bouras further teaches that "it is desirable that enough liquid epoxy be deposited to encapsulate all of the electrical interconnections and so that a fillet 18a is formed along the side edges of the chip 10." Col. 2, ln. 16-19. This teaches away from a control unit constructed to control a discharging head to leave a portion of the electrode exposed, as recited in claims 36 and 40. Applicant respectfully submits that Bouras does not

disclose, teach, or suggest that “raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode,” as recited in claims 36, 40, and 41. As stated above, this limitation is supported by the claims as well as the specification, and is a structural limitation of claims 36 and 40 as amended.

Since Bouras, even with Ciardella II, does not disclose all of the limitations of claims 36, 40 and 41, claims 36, 40 and 41 are not anticipated by Bouras. Claims 42-44 depend from independent claim 41 and are patentable at least for the reasons mentioned above. Applicant respectfully requests that the 35 U.S.C. § 102(b) rejection of claims 36, 40 and 41-44 be withdrawn and the claims allowed.

Claims 5, 9, 27 and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ciardella I in view of Nakazawa (US 5,935,375). This rejection is respectfully traversed. Claims 5, 9, 27 and 31 recite structural limitations similar to claims 36 and 40. Nakazawa, which is cited as teaching a discharging mechanism with a plurality of discharging nozzles, does not cure the above identified deficiencies of Ciardella I. Ciardella I does not disclose a control unit or a means for controlling constructed to calculate a position based on image information for said drive mechanism to displace said at least one of said semiconductor wafer substrate and said discharging nozzle, or a control means constructed such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode. Since Ciardella I and Nakazawa do not teach or suggest all of the limitations of claims 5, 9, 27 and 31, these claims are not obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 5, 9, 27 and 31 be withdrawn and the claims allowed.

Claims 36 and 40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ciardella I in view of Bouras. This rejection is respectfully traversed.

As discussed above, Ciardella I does not teach or suggest a control unit **constructed** to calculate positioning. Bouras, even with reference to Ciardella II, also does not teach or suggest this limitation as explained previously. Since Bouras and Ciardella I do not teach or suggest all of the

limitations of claims 36 and 40, claims 36 and 40 are not obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 36 and 40 be withdrawn and the claims allowed.

Claims 5, 9, 27 and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bouras and Ciardella II in view of Nakazawa. This rejection is respectfully traversed.

Claims 5, 9, 27 and 31 contain similar limitations as claims 36 and 40, which are patentable over Bouras and Ciardella II. Specifically, claims 5, 9, 27 and 31 recite a control means or a control unit constructed to calculate a position such that a portion of the substrate is not covered with resin, or a control means constructed such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode.. As discussed above, Bouras discloses that an epoxy 18 and solder pads 14 completely cover the solder balls 12. FIGs. 2-3; Col. 1, ln. 48-50 and 58-67. Bouras further teaches that “it is desirable that enough liquid epoxy be deposited to encapsulate all of the electrical interconnections and so that a fillet 18a is formed along the side edges of the chip 10.” Col. 2, ln. 16-19. This teaches away from a control unit or control means constructed to control a drive mechanism to leave a portion of the electrode exposed. Nakazawa, which is cited as teaching a discharging mechanism with a plurality of discharging nozzles, does not cure the above identified deficiencies of Bouras and Ciardella II .

Since Bouras, Ciardella II, and Nakazawa do not teach or suggest all of the limitations of claims 5, 9, 27 and 31, claims 5, 9, 27 and 31 are not obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 5, 9, 27 and 31 be withdrawn and the claims allowed.

Claims 5, 9, 27, 31 and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ciardella I in view of Prentice (US 6,007,631). This rejection is respectfully traversed. Claim 39 recites limitations similar to those discussed above for claims 5, 9, 27, and 31; therefore, Prentice, which was cited for teaching other limitations, does not cure the above-discussed deficiencies of Ciardella I. Thus, Prentice does not remedy the deficiencies of Ciardella I. Since

Ciardella I and Prentice do not teach or suggest all of the limitations of claims 5, 9, 27, 31, and 39, claims 5, 9, 27, 31, and 39 are not obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 5, 9, 27, 31, and 39 be withdrawn and the claims allowed.

Claims 5, 9, 27, 31, and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bouras and Ciardella II in view of Prentice. This rejection is respectfully traversed.

As discussed above, Bouras discloses that an epoxy 18 and solder pads 14 completely cover the solder balls 12. FIGs. 2-3; Col. 1, ln. 48-50 and 58-67. Bouras further teaches that “it is desirable that enough liquid epoxy be deposited to encapsulate all of the electrical interconnections and so that a fillet 18a is formed along the side edges of the chip 10.” Col. 2, ln. 16-19. This teaches away from a control unit constructed to control a drive mechanism to leave a portion of the electrode exposed, or a control means constructed such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode.. Applicant respectfully submits that Bouras does not disclose, teach, or suggest a control unit or means constructed to calculate a position based on said image information for said drive mechanism to displace said at least one of said semiconductor wafer substrate and said discharging nozzle, and for said discharging mechanism to discharge said droplets of raw sealant resin on said first surface of said semiconductor wafer substrate excluding said at least a portion of said electrode, which is recited in claims 5, 9, 27, 31, and 39. As explained above, this limitation is supported by both the claim language as well as the specification. Nor is Prentice cited for these limitations. Thus, Prentice does not remedy the deficiencies of Bouras.

Since Bouras, Ciardella II, and Prentice do not teach or suggest all of the limitations of claims 5, 9, 27, 31, and 39, claims 5, 9, 27, 31, and 39 are not obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 5, 9, 27, 31, and 39 be withdrawn and the claims allowed.

Claims 5, 9, 27, 31, and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ciardella I in view of Cavallaro (US 6,017,392). This rejection is respectfully traversed. Cavallaro, which was cited for teaching two discharging mechanisms, does not cure the above-discussed deficiencies of Ciardella I. Since Ciardella I and Cavallaro do not teach or suggest all of the limitations of claims 5, 9, 27, 31, and 39, claims 5, 9, 27, 31, and 39 are not obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 5, 9, 27, 31, and 39 be withdrawn and the claims allowed.

Claims 5, 9, 27, 31, and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bouras and Ciardella II in view of Cavallaro. This rejection is respectfully traversed. As discussed above, Bouras discloses that an epoxy 18 and solder pads 14 completely cover the solder balls 12. FIGs. 2-3; Col. 1, ln. 48-50 and 58-67. Bouras further teaches that “it is desirable that enough liquid epoxy be deposited to encapsulate all of the electrical interconnections and so that a fillet 18a is formed along the side edges of the chip 10.” Col. 2, ln. 16-19. This teaches away from a control unit constructed to control a drive mechanism to leave a portion of the electrode exposed, or a control means constructed such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode.. Applicant respectfully submits that Bouras does not disclose, teach, or suggest a control unit constructed to calculate a position based on image information, or a control means constructed such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode, as recited in claims 5, 9, 27, 31, and 39. Nor is Cavallaro cited for these limitations. Thus, Cavallaro does not remedy the deficiencies of Bouras.

Since Bouras, Ciardella II, and Cavallaro do not teach or suggest all of the limitations of claims 5, 9, 27, 31, and 39, claims 5, 9, 27, 31, and 39 are not obvious over the cited combination. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 5, 9, 27, 31, and 39 be withdrawn and the claims allowed.

All of the above rejections were repeated with the addition of Sahara (US 6,713,880).  
Claims 41-44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ciardella I in view

of Sahara. Claims 36,40, and 41-44 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bouras with reference to Ciardella II in view of Sahara. Claims 5, 9, 27, and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ciardella I and Sahara in view of Nakazawa. Claims 36 and 40 stand rejected under 35 U.S.C. § 102(a) as being unpatentable over Ciardella I and furthier in view of Bouras and Sahara. Claims 5, 9, 27, and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bouras/Ciardella II, and Sahara in view of Nakazawa. Claims 5, 9, 27, 31, and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ciardella I and Sahara in view of Prentice. Claims 5, 9, 27, 31, and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bouras, Ciardella II, and Sahara in view of Prentice. Claims 5, 9, 27, 31, and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ciardella I in view of Cavallaro and Sahara. Claims 5, 9, 27, 31, and 39 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bouras and Ciardella II and further in view of Cavallaro and Sahara. These rejections are respectfully traversed.

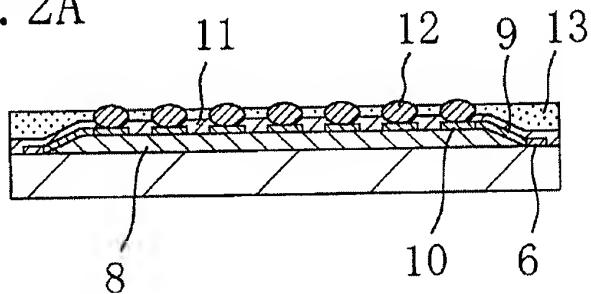
Claim 41 recites an apparatus for manufacturing a semiconductor device comprising, *inter alia*, “a substrate holding unit for holding a semiconductor wafer substrate, wherein said semiconductor wafer substrate is provided with at least one electrode formed on a first surface thereof; a discharging mechanism for discharging droplets of raw sealant resin ... onto said first surface of said semiconductor wafer substrate ...; a drive mechanism for displacing at least one of said semiconductor wafer substrate ...; [and] a control unit for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode.” Claims 5, 9, 27, 31, 36, 39, and 40 recite similar limitations. Claim 41 further recites that the control unit is constructed to control the discharging mechanism such that “a sealant resin layer having an uneven surface structure is formed from the raw sealant resin.” Applicant respectfully submits that Sahara, even when combined with any of the other cited references, does not disclose these limitations.

In addition to the discussions above with respect to the various rejections, Sahara teaches in FIG. 2A (reproduced below) that an “underfill material layer 13 is formed on the insulative resin

layer 11.” Col. 7, ln. 10-11. The underfill layer 13 that is cited in the Office Action for teaching the claimed layer of raw sealant resin is not in contact with the substrate 7. The raw sealant resin/underfill material layer 13 is not attached to the substrate, it is attached to the surface of the insulative resin layer. Applicant respectfully submits that Sahara does not disclose, teach, or suggest “a control unit for controlling said discharging mechanism and said drive mechanism such that said raw sealant resin is attached to said first surface of said semiconductor wafer substrate excluding at least a portion of said electrode,” as recited in claim 12. The Office Action states at paragraph 9 that the claim language does not require that the resin sealing contact the substrate. Applicant respectfully disagrees. The claim language reads “said raw sealant resin is attached to said first surface of said semiconductor wafer substrate.” Attachment requires contact.

Sahara FIG. 2A)

FIG. 2A



As noted above, the Office Action admits that Bouras, Ciardella I, and Ciardella II do not teach these limitations. Thus, none of Bouras, Ciardella I, or Ciardella II remedies the deficiencies of Sahara. Nakazawa, Prentice, and Cavallaro were cited for other limitations, and do not cure these deficiencies, either.

Since Sahara, combined with any of the other cited references, does not teach all of the limitations of claims 5, 9, 27, 31, 36, 39, and 40-41, claims 5, 9, 27, 31, 36, 39, and 40-41 are not obvious over the cited combinations.

Claims 42-44 depend from claim 41, and are patentable at least for the reasons mentioned above, and on their own merits. For example, although the Office Action asserts that Ciardella I is

“capable of” forming various structures, there is no actual disclosure in Ciardella I of any structures such as the control unit as recited in dependent claims 42-44. Furthermore, although the Office Aciton asserts at page 33 that “Sahara suggests that [the cited] numerical limitations are obvious,” there is no citation as to how or where Sahara makes such a suggestion.

In addition, the Office Action asserts at page 33 that Sahara includes a motivation for using the claim 42 concave structure at Col. 10, ln 19-21. However, this passage actually refers to a motivation for using a raised fillet (i.e., convex, not concave) which encloses the electrode. This also directly contradicts the concave limitation of claim 44.

Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claims 5, 9, 27, 31, 36, 39, and 40-44 be withdrawn and the claims allowed.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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